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ABSTRACT

Systems for preventing/controlling compressor surge in an electrically assisted turbocharger comprise a turbocharger having an electric motor disposed around a turbocharger shaft. The electric motor controller is electrically coupled to the electric motor for controlling the rotational movement provided by the electric motor to the turbocharger shaft. A memory is electrically coupled to the electric motor controller and comprises a multi-dimensional map of compressor surge conditions stored therein. Sensors are used to provide desired engine and/or turbocharger operating information for comparing against the stored map data. The sensors are electrically coupled to the electric motor controller. The controller plots the actual operating information provided by the sensors on the stored map to evaluate whether the turbocharger is operating in different operating regions. If the plotted turbocharger operation falls within a surge risk or surge state operating region, the motor controller operates the electric motor in a manner that reduces the rotational speed of the turbocharger shaft.